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ABSTRACT

Based on an approach that analyzes the structure of educational processes in relation to the structure of its outcome, this paper develops the argument that the function that a specific environment fulfills depends critically on who is in control within the environment, and suggests how the implications of this argument might be tested. The hypothesis is that an educational purpose will be most effectively accomplished when control of the teaching-learning process is congruent with the control of the thought-action intended as an educational outcome. To present the theory, teacher, joint teacher-and-learner, and learner control are analyzed as process, and the control of community, competence, and individuation are analyzed as three categories of outcomes. Because the problem has not been conceptualized in tri-parte terms before, no single research study is considered to contain the full range of necessary distinctions. Control is seen to be one of the dimensions through which an analysis of the relationship between teaching-learning processes and outcomes can be made. A structural analysis of control is found to reveal limitations in past research on classrooms. (Author/AM)

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Community, Competence, and Individuation: The Effects of Different Controls in Educational Environments

Joseph C. Grannis

Educational environments can contribute to greater community among students, increased competence in their use of concepts and skills, or enhancement of their development as unique individuals. The function that a specific environment fulfills depends critically on who is in control within the environment. The paper which follows develops this argument and suggests how its implications might be tested.

Approach to the Problem

Much of the research on educational processes fails to link program variations (32, 110) or classroom behaviors (47, 98, 99) to particular outcomes.* In 1968, Dubin and Taveggia concluded:

> No particular method of college instruction is . . . to be preferred over another, when evaluated by student examination performances (32, p. 10).

These authors made this further observation, however:

> The claim for 'other results' turns out to be a . . . plea for an adequate theory of teaching-learning in which the output variables are more imaginatively defined than by the final examination grade (32, p. 9).

Some research has indeed approached the problem more imaginatively, for example the Progressive Era studies of the New York City Activity Program (55, 128) and some of the contemporary Follow Through research (106, 108, 109). These efforts have considered program design, observed behavior, and outcomes keyed to goals that are unique, as well as common, to the programs compared. This research lends itself to new interpretations.

My own approach analyzes the structure of educational process in relation to the structure of its outcomes. My hypothesis is that in any educational situation, controls of process and controls of outcome tend toward congruence. This applies whether "outcome" is defined simply as the end-state of the situation, or as a transfer or generalization of learning to a new situation. A corollary is that the most successful teaching-learning controls are those congruent with the intended outcome.

To present this theory, we must first show how we look at control in an educational environment. This analysis focuses on the process side of the process-outcome equation. Processes, however, are to some extent the outcomes of earlier situations, so the discussion necessarily overlaps with our analysis of outcomes. Second, we will examine the control of three categories of outcomes: community, competence and individuation. These can be thought of as classes of "behavioral objectives," but we prefer to speak of "thought and/or action" in place of the narrower concept of "behavior" (45, 75). Third, we will

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* Numbers in parentheses refer to references at the end of this article.

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interpret some of the more relevant research on teaching-learning processes and outcomes. In the course of this discussion, we will suggest further research called for by our analysis.

Control is just one of the dimensions through which we can make an analysis of the relationship between teaching-learning processes and outcomes. The method of analysis, however, has more general implications. In fact, a structural analysis of control reveals how limited most classroom research has been. In the available literature, we find only clues to the nature of the problem.

Teacher, joint teacher-and-learner, and learner control

The idea of classrooms as "teacher-centered" or "learner-centered" is familiar. Its polarization has lent to abuse in the educational controversy over what achievement means and how it is fostered (29). Rogers, confronting this problem in his famous exchange with Skinner, distinguished between "external control," "influence," and "internal control" (96). From the literature on parent-child relationships, Smith and Hudgins adapted the concepts of "complete parent control or domination," "shared control," and "complete parent submission or lack of control" (105). Herbert described three types of lesson forms in which (1) the teacher modifies the subject matter, (2) teacher and students modify subject matter, and (3) students modify subject matter (50). All of these schemes suggest the desirability of specifying a form of control located midway between total teacher control and total learner control.

Varying conditions of teacher and/or learner control were evident in our own analysis of Project Follow Through classrooms sponsored by Bank Street College of Education, the University of Kansas (Bushell), and the University of Oregon (Engelmann-Becker), as well as classrooms sponsored by the Creative Teaching Workshop in New York. It was necessary to recognize teacher, joint teacher-and-learner, and learner controls, in order to capture environmental features which were emphasized in the rationales of the sponsors (69) and intuitively sensed by the observer.

For example, consider "options" – the choices a learner can make about his or her activity at a given time. Although uncontrollable factors limit options in any classroom, we can still distinguish readily between times when the teacher makes the choices and times when the learner chooses unconditionally. Between these extremes, there is a region of limited or conditional choice: the learner may have been assigned several activities, with choice over their order; there may be several specified activities from which the learner must choose; or the learner may choose when to engage in an activity that has a set completion time.

Now consider "pacing" – the regulation of the learner's rate of activity. Again conceding external constraints, we distinguish easily between times when a teacher or teacher surrogate is present and making demands upon the learner's rate (these could be demands to slow up the rate as well as to maintain or increase it) from situations when the teacher is absent from the phenomenal vicinity of the learner. Midway between these is a deliberately established condition of joint pacing. For example, a teacher may circle a table, regularly moving in and out of the immediate vicinity of a learner who is doing some task at "his own rate." (Tutorials might also be characterized by joint pacing, though this is a harder discrimination to make.)

There are other learning conditions that can be viewed as controlled by the teacher, the learner, or the teacher and the learner jointly. These include initiation and termination of an activity; specific operations of the activity; task feedback; task reward; teacher-learner interaction; learner-learner interaction; and the learner's location in space. Indeed, any condition that can be manipulated within the educational environment is subject to differential controls.

Descriptions of controls may be found in most of the empirical studies that have included open or informal classrooms. The studies have used systematic observations of behavior (55, 93, 108, 109); quantification of the time learners spend under various conditions (44, 74); role analysis of anecdotal and behavior stream records of teachers (38, 56); a comparison of surveyed teachers' beliefs to observers' ratings of their practices (124); a questionnaire about teachers' practices (81); in-depth interviews of teachers and their advisors (18); and participant observation in classrooms (11).

Defining control by a teacher and/or a learner does present problems. It would be a mistake to objectify a definition so as to disregard differences felt by individuals. On the other hand, there are fairly definite signs of control over the elements of a learning situation. A conspicuous example is the control devices used to signal a learner's options: teachers' statements, lists on a paper or blackboard, sign-up systems, contracts and area designations.

Conceptual questions are obviously linked to empirical ones. For example, the role of materials in the control of task feedback poses an intriguing conceptual problem. Learners can get feedback for a variety of questions from an object that can be manipulated: does it work, break, squeak, fit, spill over, or dissolve? Compared to a workpage that poses questions but does not provide answers, such materials offer the learner high control over feedback. Other materials furnish the learner with feedback, but only from operations that a teacher has required or anticipated. Examples of joint teacher-and-learner controlled feedback include a workpage with answers printed in the margin, a text with answers to chapter questions at the end of

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the book, material to be copied, a picture puzzle or crossword puzzle, or the Montessori knob-cylinders and frame. The learner has access to feedback without asking the teacher for it, but the teacher has determined the feedback that the learner receives.

How does one classify Cuisenaire rods in this scheme? The answer depends upon what use the learner makes of them, whether to obtain answers to set problems, or to explore their properties in a broader way. This question might lead us to broaden the joint control category to include not only "single-correct-answer-available" feedback but also "system of correct-answers-available" feedback. A related question is whether the materials of a reading task -- such as a story -- present no feedback, single answers, systematic feedback, or virtually unlimited feedback to the learner. In the case of reading, the answer depends on the reader's ability to extract feedback from the redundancy of the encoded information (104). This involves systematic as well as single answer feedback, though it is a matter of degree as much as kind. *The question of what constitutes the most satisfactory feedback for the teacher and the learner is central to the definition of "joint" teacher-and-learner control.*

It is because competence with concepts and skills involves systematic operations that one suspects systematic feedback is required for their learning. This, however, jumps to the next section of our argument. The examination of one more learning condition is needed to prepare for this step.

Learner-learner interaction is controlled by the teacher when it is proscribed or prescribed in detail. Examples include both silent activity and predetermined or ritualized interactions such as the enactment of a flag ceremony, a game of musical chairs, or a mass recitation of the alphabet. Learner-learner interaction is controlled by the learners themselves when they are free to interact as they choose with other learners -- for example, in fantasy play with blocks or in a project that is too difficult for one individual alone. The criterion of learner control is that the teacher does not prescribe the interactions. In joint teacher-and-learner controlled interactions, general rules or roles are specified by the teacher or a teacher surrogate, but the learners are free to determine the particulars of their behavior. In the classrooms we observed, this seemed to be a largely neglected possibility. Role-playing, flashcards, chess and other board games involved joint teacher-and-learner control. But more general systems, such as team learning (35), interdependent learning (42), and peer mediated instruction (97) were not developed. The peer helping we observed in relation to academic tasks was very sporadic.

That the teacher shares control of the interactions in an activity like chess may strain credulity. In fact the teacher *often* functions in the classroom as the representative of some controlling "other," even in settings which appear to be fully teacher controlled. Whether a text is religious, political, musical, or academic, it is often authoritative to teacher and learner alike. A critical question then becomes whether the "other" represented by the teacher is the collective other including the teacher and the learners, a neutral other (an objective task or task master), or an alien other that the teacher imposes on the learners.

To represent these last possibilities schematically, a scheme similar to the one in Smith and Hudgins (105) is useful. In Figure 1, the control of the pedagogical relationship (12) can be held by the teacher, by the teacher and the learner jointly, or by the learner. At the same time, the learner experiences positive, neutral, or negative regard from the teacher. *It is possible to analyze the conditions of learning in an educational environment just as specifically from the standpoint of regard as from the standpoint of control.* We can consider the relation between the options created and what the learners value (61), the relation between pacing and learning rhythms (65), the compatibility of interactions prescribed for the learners with interaction patterns of their culture (89), the way materials reflect the activities and identities of the children (73), and the relationship of the language of instruction to the learners' native language (63). Many problems are obscured when control is considered out of relation to regard.

Figure 1*

TWO MAJOR DIMENSIONS OF OTHER-SELF RELATIONSHIPS IN THE EDUCATIONAL ENVIRONMENT FROM THE LEARNER STANDPOINT

Control of the Pedagogical Relationship	**Nature of Regard in the Environment**		
	Positive	Neutral	Negative
Other person, object, symbol For example: *Teacher*			
Joint other and self For example: *Joint teacher and learner*			
Self For example: *Learner*			

*Adapted from Smith and Hudgins (105, p. 115). The table is labeled "two major dimensions" to imply the possibility of other dimensions, specifically a third: active-passive. This consistently emerges as a dimension of parent-child relationships along with the two represented above (6) and consistently appears again as one of three primary dimensions of semantic space: evaluation, potency, and activity (86). The ramifications of the activity dimension of the educational environment might be fully as complex as those of control and regard (18).

Community, competence, and individuation as educational goals

The threefold classification of educational goals has some precedent. For example, the Anglo-American Conference on the Teaching of English posited three historical models of English instruction that have been widely accepted in schools on both sides of the Atlantic. The first centered on skills and was appropriate to an era when literacy was the prime demand. The second stressed cultural heritage, the need for civilizing and socially unifying content. The third focused on personal growth, the need to re-examine learning processes and their meaning to the individual (30). Similarly, MacDonald identifies three curriculum ideologies reflecting "control interests," "consensus interests," and "liberation interests." Cultural heritage and consensus correspond to our community category. The idea of "control interests" might be interpreted as the control of the learner by the teacher but our own analysis focuses more on certain tasks requiring control by both the teacher and the learner. MacDonald's remarks, albeit unintentionally, are consistent with this point of view:

> Wherever such terms as objectives, systems, quality control, efficiency, effectiveness, criterion-referenced evaluation, etc., are used to the exclusion of others, it is clearly in the interest of control. The control syndrome operates with a clear idea of preordinate goals and evaluation. Most individualization is in the interest of control (70, p. 5).

Control is a central issue in the development of community, competence, and individuation alike. Community involves the greatest degree of external control, individuation entails the greatest degree of internal control, and competence requires joint control by society and self. In a developmental frame of reference, communities can be maintained and reconstructed more voluntarily by individuals who have developed high internal controls, individuation entails internalization of the community's controls, and competence increases as self and others join to stipulate what is to be controlled. We shall take cognizance of the developmental point of view at the conclusion of our discussion of classes of educational goals.

Community

The fundamental meaning of community is identity or similarity of individuals within a collection. A more complex definition recognizes the integration of members who are differentiated from one another, and requires that we ask what are the rules that describe such integration. In either case, community educational goals are concerned with the transmission of knowledge, sentiments, and actions, which form or are intended to form the basis of unity among participants.

Community goals in education include learning the signs and symbols of the community; learning the names of significant persons, places, things, occurrences; celebrating origin stories, and heroic or moral examples; learning the community's place in the universe and who does or does not belong; learning what the community holds to be true, good, and beautiful, or wrong, bad, and dangerous. Community educational activities include a Puerto Rican Discovery Day assembly; a class in the thought of Mao Tse-tung which includes "singing songs and telling stories with a revolutionary content" (102); a *Sesame Street* chanting of the alphabet; a sharing time when children recount to one another what they have done during the day; a feminist consciousness-raising meeting; and a lecture by a distinguished member of one's profession or occupation.

Communities that first come to mind from these examples are national, ethnic, or territorial, but as Minar points out:

> . . . functional specialization pulls men out of an important part of their interaction with their neighbors, and bodies of specialized men themselves become communities (79, p. 140).

All of the community educational goals mentioned above are goals of academic communities as much as of any others. Essential as it may be to the perpetuation of scholarship as a social institution, however, the allegiance of teachers to an academic or professional community often becomes a source of tension in schools. Role conflicts emerge for teachers since the communities of their learners are based more on age, sex, and territory, this last intersecting almost inevitably with ethnic and economic communities. In the elementary schools of mainstream America, the rite of learning the 3 R's has constituted a general basis of solidarity for teachers and learners *as* community (10). In the secondary schools, a much uneasier alliance is maintained, one that often depends on extracurricular activities, especially athletics, to generate strong attachments among students (27, 49, 125). Of course, some secondary school students have already become novitiates in the academies and professions. On the other hand, many primary grade pupils have been alienated from or never have felt part of the school community.

Minority ethnic groups in America have agitated throughout the past century for community control of education to preserve and instill a sense of ethnic community that is debilitated in contrary arrangements (78). One measure, long institutionalized in the private and parochial schools, is the creation of alternative schools for particular ethnic groups. In these schools, the very survival of specific communities is at stake; thus, one sees in them the most conspicuous allegiance to community goals of education:

> For the 30 students in Room 318 of the Robert Treat School, the day begins with a salute to the flag – the red, black and green flag of black nationalism. "Red is for the blood of our forefathers which has not been shed in vain," the students recite, standing with their arms folded across their chests in a gesture known in Swahili as "ungalia," meaning peace and power (19, p. 42).
>
> Corporate communality is exemplified at the Nairobi Day School, in East Palo Alto . . . by the morning assembly where parents come and sit with the children to chat and sing, to exchange commitments and to get a little happy feeling inside (127, p. 378).
>
> MOJA and LOGO are written on the wall at Harlem Prep. These two words of African origin for unity and

CORRECTIONS

The quote from Ogunkeye on page 5 should read:

> There are so many things that need to be corrected, changed, discarded. But I guess it all comes down to the creation of a new man. A new Afrikan man with a correct set of values whose primary objective is to seek what's best for Black people as opposed to seeking what's best for me, myself, my family.

The following reference should be included as 45 on page 14:

Hampshire, Stuart. Thought and Action. London: Chatto and Windus, 1959.

> brotherhood have as many meanings as our school's students have diverse experiences. But each of our lives is united for one immediate aim – to go on to college. As a family helps its members get a start in life, we students help each other toward our common goal (21, p. 280).
>
> There are so many things that need to be corrected, changed, discarded. But I guess it all comes down to the creation of a new man. A new Afrikan man for me, myself, my family (84, p. 32).

Politics and economics, in the narrow sense, are only a fraction of what is involved in "community control" of education. Most pervasively, control of the environment of education allows the transmission and evocation of community knowlegde, sentiments, and actions. Students are oriented to the collectivity through participation in settings controlled by the community, the collective "other."

The sense of community is most intense in those settings which all the members of a community participate in together. Individuals in these settings are oriented to a common focal point in space-time (36, 71). The pattern of participant interactions with one another and with symbol-vested objects creates and renews common meanings, articulating the relationships of the familiar and the strange, the joyful and the sad, the safe and the dangerous (118). Outwardly the collective other controls through specification of the time, the place, the furnishings, the participants, and the events of the educational settings. That is, the other controls options, pacing, materials feedback, and participant interaction, by the conscious design of community representative or through the enactment of time-honored rituals.

Inwardly, the community maintains control because the most significant elements of any group are those whose meanings generate a unique response within the collective. The same signs and symbols, names, gestures, stories, and ceremonies that were mentioned earlier are partially embedded in the setingts controlled by the collective other. As Geertz (40) emphasizes, the meanings of these elements can only be partially apprehended by those who do not participate in the settings which contain them. This circumstance continually reinforces the individual's participation in community settings, so long as the contextual or historical bonding of the elements is not eroded.

Does a classroom become a community if it is controlled in virtually all respects by a teacher? Again, the evocation and transmission of community depends partially on the regard between teacher and students. If the regard is negative, community may be evoked in the solidarity of the learners *against* the teacher. When regard is positive, however, we must consider the consistency of the content of the setting with its shape, its function with its form, the end with the means. A teacher-controlled lesson which aims to inculcate skills, and which associates its content with skills the learners have already partly mastered, opens a Pandora's box. Skills, by definition, are controlled in a certain degree (see below) by those who employ them, so there is a basic contradiction in teaching skills in a so-called "traditional" lesson when "traditional" means simply teacher control. In one way or another, the learners' different instrumental needs break down the teacher's control, or prevent the operationalization of the skill in question. By contrast a traditional lesson intended to explain or commemorate something of common concern to the group is very likely to generate a sense of community. The lesson might well employ skills already learned. It might even be a celebration of the class's achievement in having learned these skills. Curiously, it was the mass counting and alphabet recitations in the Engelmann–Becker classrooms that provoked our thinking. Often when teachers and children chanted sequences they had learned, a feeling of rapport suffused the group. Perhaps the very simplicity of this phenomenon makes it generally applicable to our understanding of the community setting.

At another level of abstraction, the system of controls that prevails in the total educational environment, not in the teacher controlled settings alone, reflects the definition of the teachers' and the learners' community. Levi-Strauss' (66) studies of primitive societies reveal that the prescriptions and prohibitions of behavior, so omnipresent in primitive society, are a knowledge code in structure as well as in content. The elaborate rules applying to marriage and identifying kin, to eating and naming of plants, signify by their very structure a people's understanding of how the world is constructed and how a community is located within it. Suttles' (112, 113) studies of the "social construction of community" in the neighborhoods of contemporary Chicago demonstrate that a similar mode of analysis is relevant to society today.

The structure of controls in the educational environment conveys knowledge in and of itself. First, it signifies what is important for whom. This significance is most concentrated on occasions when everyone in the environment, *including* the teacher, experiences the same control. More generally, the relative importance of community, competence and individuation is revealed by the proportions of an individual's activity that are controlled by the teacher, by the teacher and learner jointly, and by the learner. Second, the control structure for an activity or setting indicates the structure of its contents. From this point of view when teacher and learner jointly control an educational setting, they jointly determine what is to be learned as well as how it is to be learned. Of course structure of control does not disclose full meaning, but it does suggest orienting cues. In other words, the structure of controls in an educational setting orients a learner to the structure of what will be learned. Most pointedly, it indicates whether the teacher, the teacher and the learner jointly, or the learner will control the criteria of truth, goodness and beauty which measure the outcome of the teaching-learning process. A congruence of process and outcome in an educational setting results when the participants consistently take their criteria for thought-action from self, other, or self and other jointly.

The propositions advanced above are substantiated by any number of anthropological and sociological studies of contemporary schooling (12, 58, 64, 125), as well as more general critiques of the "hidden curricula" of the schools (4, 43, 88). Our analysis of competence from the standpoint of control should illuminate the propositions further.

Competence

"Competence" can be defined as the ability to have an effect on one's physical, social, or intellectual environment (cf. 126). The maintenance of community clearly requires competence, but community and competence remain distinct. Competence involves the organizations of thought-action called "concepts" and "skills." It also involves affective organizations which we shall identify as "attitudes." Difficult as these may be to discuss succinctly, they must be mentioned in this discussion. We shall begin with concepts, especially mathematics and scientific concepts since they furnish a limiting case of the questions we must answer. The central issue is the relationship of concepts, and later of skills and attitudes, to their empirical referents.

> *Within* axiomatic geometry there are precisely stated relations between the theoretical notions of the system. However, when the geometrical calculus comes to be used in some area of empirical inquiry, the coordination of these notions with experimental ideas is usually far from exact. For example, the word 'plane' as it is used in contexts of empirical inquiry is not a precisely defined term. Which surfaces are to count as planes are sometimes specified by rules for grinding bodies so that their surfaces will eventually fit snugly when placed adjacent to one another; sometimes by rules that simply involve perceptual judgments based on using the naked eye; sometimes by rules requiring the use of complicated optical instruments. The correspondence between the theoretical notion of plane and the experimental one is thus neither unique nor precise (83, p.100).

Hempel (48) conveys a similar idea through his image of a complex spatial network of theoretical concepts existing at some remove from empirical reality and anchored only at certain observation points. He too recognizes the indefiniteness of the reference of these concepts. Hempel, however, does not interpret this partial determination of meaning to be a limitation of science. On the contrary, he sees it providing an "openness of meaning" vis-a-vis new operations.

One might think that science is open to new meaning simply through further observation. Scientific observation, however, depends on two conditions. One is the stipulation of new concepts or relationships among concepts (95). Stipulation is, we emphasize, a form of *social* contract or agreement (23). One must enter into stipulations and the social arrangements that attend them in order to use, or to contribute to, scientific knowledge. The second condition of scientific observation is what Polanyi (92) calls "personal knowledge," the judgments and risks made by the individual scientist in establishing correspondences between the theoretical and the empirical. Vygotsky (123) characterized the school learning of a scientific concept as the learner "filling in" the abstract vessel of the definition with experiential detail, and in the process reorganizing the concepts formed "spontaneously" in non-school experience. This process occurs not only in children, but in all who learn a scientific concept. In a fundamental way, individuals *complete* the meanings of concepts whose definitions are socially stipulated.

As we observed before, the physical sciences are only a limiting case, an area of knowledge where we least expect the indefiniteness of concepts. Social scientists agree (7, 50, 100) and periodically explain to the public (103) that the reference of social science concepts to reality is far less definite. The same observation applies to concepts in the arts and humanities generally (101).

Until quite recently, psychological studies of concept learning or formation largely ignored this problem of reference. Most experimental studies of concept attainment attempted to control very precisely the relationship of concepts to their referents and to restrict the outside information that the learner could bring to the task (52). Developmental studies attended primarily to the part played by the learner's own schemata in the formation of concepts at different stages. Relatively little heed was paid to the contribution instruction makes to concept learning (cf. 9, 62). Given these biases, it is no wonder that psychology did not help to narrow the gap between teacher- and learner-controlled concept formation. The advocates of programmed instruction still imagine that it is possible to anticipate all the examples a learner will need before attaining a concept (8). Educators who favor a more experiential approach tend to underutilize the teacher's ability to organize the learner's experience through stipulations, especially definitions.

Within the last few years, experimental psychologists have shifted to studying the attainment and use of more complex concepts. The very title of a book that summarizes much of this new research, *Conceptual Learning and Development* (59), indicates that the gap between experimental and developmental approaches is being closed. The new research incorporates both the teacher's and the learner's contributions to concept formation.

What has been written here about concepts could also be said of skills. These have been greatly oversimplified in the experimental research on motor-skill learning (119). What is at stake is not just the complexity of skills but, again, the indefiniteness of their reference. In fact, the indefiniteness of skills, the need to adapt them to ever changing and somewhat unpredictable circumstances, is more generally recognized. Blauner, whose analysis of controls in the work situation has influenced and complements this analysis of the educational environment, writes the following:

> The freedom to determine techniques of work, to choose one's tools, and to vary the sequence of operations, is part of the nature and traditions of craftsmanship. Because each job is somewhat different from previous jobs, problems continually arise which require a craftsman to make decisions. Traditional skill thus involves the frequent use of judgment and initiative, aspects of a job which give the worker a feeling of control over his environment (13, p. 43).

Craft traditions also involve stipulations, most obviously those exercised by the potential consumer of the craftsman's product. Equally important are the stipulations of the craftman's fellow workers past and present, as reflected in the tools and techniques he inherits and the necessity of articulating his work

with that of others. A very significant line of experimentation in contemporary industry involves giving the worker more control over options, pacing, interaction with co-workers, task operations, and product assessment or "quality control." This movement could be characterized as a shift from management controlled to joint management and worker controlled conditions for production (82, 94, 120).

Thomas and Znaniecki's statement that an attitude is "the individual tendency to react, either positively or negatively, to a given social value" (115, p. 24) and Allport's definition of an attitude as a "neuropsychic state of readiness for mental and physical activity" (2, p. 799) are useful in focusing on individuals' evaluative orientations. However, "attitude" may be an overly-inclusive term for the affective organizations that we can relate to competence. We are concerned here with attitudes that can vary substantially within a community or culture, not those that might be so embedded in the culture as to be unchangeable as long as an individual remains in his culture. Again, we are concerned with attitudes that are subject to individuals' conscious control, at least to the degree that concepts and skills involve conscious control (66, 123).

With these restrictions we can think of the attitudes that are the focus of "training groups" as the affective counterparts of concepts and skills (16). In institutionally-oriented training programs, the learning and unlearning of attitudes is typically associated with the learning of new concepts and skills. By applying the results from these programs to the problem of changing, or *influencing* (26) attitudes more generally, we might conclude that experimenters and educators will be more successful when they allow their subjects more freedom to experiment with the consequences of different attitudes (117).

Although this argument points toward joint teacher and learner control for the development of competencies we do not wish to claim that only joint control should be employed for this purpose. There is value in the teacher's modeling of a competence to be learned on the one hand (130), and the learner's consolidation of a competence through its application in self-directed expression and problem solving on the other (72). What we envision is a sequence, or playing back and forth, between settings embodying different forms of control. A given concept, skill, or attitude could be demonstrated by a teacher at one time, the focus of a didactic game or task at a second time, and employed spontaneously by a learner at a third time (cf. 1). Just such a sequence is described by Philips for the development of competence among children in a North American Indian community:

> The contexts described here in which learning takes place can be perceived as an idealized sequence of three steps: (1) observation, which of course includes listening; (2) supervised participation; and (3) private, self-initiated self-testing. It is not the case that all acquisition of skills proceeds through such phases, however, but rather only some of these skills that Indian adults consciously and deliberately teach their children and which the children consciously try to learn. Those which are learned through less deliberate means must to some extent invoke similar structuring, but it is difficult to determine to what extent (89, p.387).

Philips' caveat is important enough to state more generally. The teaching of competence does not inevitably occur in the way suggested here. Rather, an appropriate teaching-learning process must be deliberately applied. Both political (5) and psychological (87) factors account for the polarization of pedagogies that is reflected in the teacher "or" learner formulation of the question. The joint teacher-and-learner-controlled setting is left out of this formulation even though it is, from a structural point of view, the crux of pedagogy for competence. This is illustrated in the following passage when Manu, a 12-year-old informant on the life of the Tahitians, discusses the learning of skills:

> Some parents direct their children even though the child knows how to do the work . . . Some parents prefer to leave their children alone. Not to teach them anything . . . Some parents, at the time they see that a child begins to know how to do a task, that's enough, they don't trouble you anymore. Only at the one time that the parent sees you have made a mistake in doing the task, that is the time he counsels you, "Not like that, but like this" (67, pp. 451-452).

Piaget's processes of assimilation, accomodation, and equilibriation correspond, in our view, to learning controlled by self, other, and self-and-other jointly. One would not surmise this, however, from Piaget's own writing about pedagogy:

> Generally speaking, since every discipline must include a certain body of acquired facts as well as the possibility of giving rise to numerous research activities and activities of rediscovery, it is possible to envisage a balance being struck, varying from subject to subject between the different parts to be played by memorizing and free activity (90, p. 78).

In this passage and the discussion that follows, the matter is still polarized. A "balance" is not distinguished operationally from "memorizing" and "free activity." Why dwell upon this? Our observations in Follow Through and other classrooms seldom include settings *consistently* controlled throughout by a teacher and learner jointly. Although different teachers or program sponsors have worked out the conditions of joint control that we described in the first section of this article, they are usually combined incongruously with other teacher-*or* learner-controlled conditions. For example, in a setting where the materials provide single answer feedback and the teacher and learner pace the activity jointly, the teacher alone may control the choice of activity while the learners control learner-learner interaction.

Nevertheless, settings consistently controlled by teacher and learner jointly do not exist only in our imagination. Joint teacher and learner control appears to have been the essence of Montessori's pedagogy. In the Montessori classroom "work" time contains a specified set of activities or materials from which the child chooses what to do. After demonstrating the use of a material, a teacher moves in and out of the setting, observing each child closely so that she can intervene at appro-

priate junctures to label the results of the child's operations: "long" and "short." "rough" and "smooth." The floor mats the children sit on constrain their interactions though they are not meant to abolish them. The design of the learning materials provides convergent feedback for the children's operations. Of course, some of Montessori's more general language, for example in *Spontaneous Activity in Education*, has allowed educators to associate her pedagogy with more thoroughly learner-controlled education. Equally, her materials and procedures have been institutionalized into nonadaptive classroom rituals. In short, interpretations of Montessori have been polarized. The outcomes Montessori stressed were more perceptual than conceptual; yet her principles might well be extended to more conceptual tasks.

Weikart's Piagetian "cognitively oriented curriculum" emphasizes concepts and skills deliberately taught in an "open framework" classroom which features joint teacher and learner control (107). Some of the "exemplary programs for the education of disadvantaged children" described by Hawkridge et al. (46) also involve jointly controlled conditions. No doubt many individual teachers have arrived at classroom solutions embodying various forms of joint control. Two widely divergent examples are Marshall's *Law and Order in Grade 6-E* (73) and Highet's *The Art of Teaching* (51).

The indefinite reference of concepts is ironically reflected in this comment by Glaser on *how scientists are learning* to design education environments:

> While it has been axiomatic that practice can feed on research, it now must be recognized that research, in turn, feeds on and is often invigorated by the requirements of practice. The coupling between these two elements is far closer than many of us have realized (41, p. 130).

Glaser contrasts the prevailing "selective mode" of education with an "adaptive mode" that would accommodate different competencies and cognitive styles. An adaptive curriculum would have "many points of entry, different methods of instruction, and options among instructional objectives" (41, p. 131). Furthermore,

> Because an essential part of adapting the environment to the capabilities of the learner involves adjustments made by the learner himself, students must acquire increasing competencies in self-directed learning (41, p. 132).

Our own analysis clarifies what "adaptive" might mean. To complete this analysis, we turn briefly, to individuation.

Individuation

Individuation is the definition, expression and development of a person's distinctive self. It can be manifested in actions as simple as saying, "I want that," frowning, or running about. Individuation can also be quite complex. It may entail a communal pattern of thought-action to a new domain or the reconstruction of the pattern itself.

At this level of interpretation, there is less disagreement about the nature of individuation than about its relative priority as an educational goal. There are also doubts about whether teachers can foster it in institutional settings where, for external and internal reasons, the teacher is placed in a position of primal authority. Even when individuation is officially sanctioned, it is still easy for a teacher to convert the learner's every spontaneous move into an occasion for teaching something the teacher already knows. Individuation calls for more than accommodating the learner in order to bring him to understand a concept or skill specified in the curriculum. Properly understood individuation involves trying to adopt the learner's point of view in order to facilitate his own intentions (34). Both types of adaptation are illustrated beautifully in Gardner and Cass's (38) transcripts of exchanges between English teachers and young children.

"Creativity" and "problem solving" are often related to and, indeed, equated with, individuation. Their definitions however, are often inadequate. For example, Gagne describes problem solving as "construction" of "new rules" in an "idiosyncratic manner," and creativity as an extension of problem solving,

> an 'inductive leap,' a combining of ideas that come from widely separated knowledge systems, a bold use of analogy that transcends what is usually meant by generalizing within a class of problem situations (37, p. 228).

As valid as these definitions might be in emphasizing the innovative and idiosyncratic, they are misleading in a different sense. Gagne represents problem solving and creativity at the top of a hierarchy of types of learning which is ordered by abstractness. The implication that they would not occur in more concrete contexts reflects a more general limitation of Gagne's scheme. Although it accurately describes hierarchical levels in the process of abstraction, it ignores the concrete contexts of what Gagne regards as the "basic learning types," signal and stimulus-response learning. The notion that this learning is combined into higher types of learning *presumes* its abstraction (often by a teacher, as is clear from his examples) from its found contexts. What interests us here is the phenomenon of "bricolage" (66), which involves the extension of a concrete scheme to a new context beyond the one in which it is partially embedded. This is a highly concrete form of problem solving and creativity which can be observed alike in the crafts of the home or industry and in the play of artists and children (114).

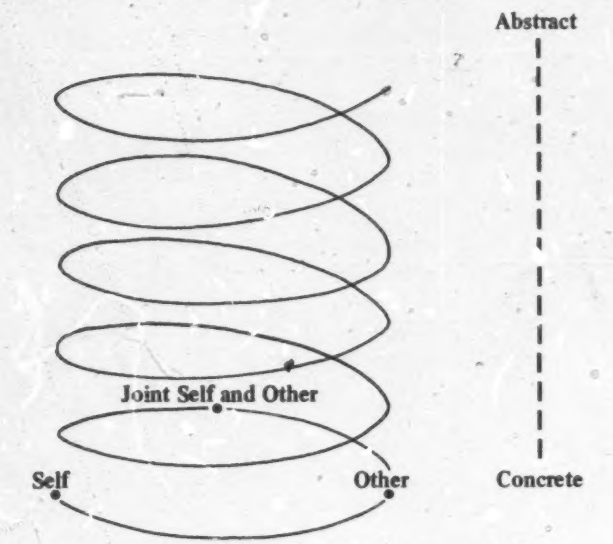
We argued before that competence always requires going beyond what is specified by rules or conventions. Thus individuation must be regarded as a matter of degree. The differences in control between competence and community structures should also be treated as a matter of degree. Continuous dimension of control by other, self and other jointly, or self alone can be construed from the coordination of two or more individuals' thought-actions. We have focused on community, competence, and individuation to suggest the signifying as well as the adaptive functions of different degrees of control.

Yet the idea of a linear continuum obscures the dynamic of relationships between self and other. Van den Daele's (122) theory of the development of ego as decision-maker suggests a startling turn in this thinking. His theory (which is presented in different terms than the ones used here) posits the possibili-

ty that development is based on the following dynamic: Self asserts; self's assertion is not sufficient; self orients to other person (or object or symbol); other's assertion is not sufficient; the assertions of self and other are coordinated; self and other's assertion is not sufficient; self asserts again, *this time at a more abstract level;* self's assertion is not sufficient, etc. What results is a helix, as in Figure 2:

Figure 2

DEVELOPMENT OF THE RELATIONSHIPS OF SELF AND OTHER



Of course as Van den Daele (121) points out, this scheme goes back to Hegel. Van den Daele has made it operational in terms of Piagetian (assimilation, accommodation, equilibriation) concepts of development. For our present argument the scheme shows (1) how progressively abstract levels of individual development might incorporate the assertions of society; (2) how more abstract and thus special and general (these go together in a hierarchical system) communities might be built upon the agreements of individuals; and (3) how more special and general competencies can result from the articulation of communities and individuals at more abstract levels.

Again, it is essential to recognize the bias of virtually all developmental psychology in favor of abstraction, the scientist's preferred mode of thought. At each level of the model depicted above, development could also occur in a lateral direction. By an extension of the relationships defined at a given level, the process described before as concrete individuation could take place. The contemporary significance of Levi-Strauss's demonstration is that the thought of "primitive" society is intelligent and complex while it is concrete. A society can be differentiated without the alienation that so frequently accompanies high abstraction. This leads, however, to the further possibility that maximum community, competence, and individuation are incompatible. Consequently the distribution of controls in the educational environment is all the more significant.

Evaluative Empirical Research

This article does not include a separate section called "implications for practice" because we have made a concerted effort to link theory to practice throughout. Moreover, the evidence for our claims may seem substantial or thin, depending upon how much weight one gives to the sort of analysis already presented. We will now concentrate on the empirical research that evaluates different educational methods or programs. Specifically, we want to examine the empirical grounds for our hypothesis that an educational purpose will be most effectively accomplished when control of the teaching-learning process is congruent with the control of the thought-action intended as an educational outcome. Because the problem has not been adequately conceptualized in tri-parte terms before, no single research study contains the full range of necessary distinctions. Potentially similar distinctions between "expository," "guided discovery," and "pure discovery" have been made in science and mathematics pedagogy, but a study that casts all three in the form of programmed instruction (76) does not really test the relevant range of teaching-learning processes. Other studies abort the distinctions in other ways, so we can only look for leads suggesting whether and then how the distinctions we have drawn justify new research.

Focusing first on core community knowledge, sentiments, and actions, we find that formal empirical research has not asked whether learners exchange the community's salutations, tell its stories, sing its songs, or ally themselves in time of trouble or threat. Informal evaluation in recent years has taken note of these behaviors in America's alternative schools for minorities (see the references for black alternative schools above) and in the schools of other nations that stress collectivism, most recently, China. These informal accounts report that high community occurs when high proportions of educational activity are controlled by the collection other. As Bronfenbrenner emphasizes, the other includes not just the teacher, but many "others":

> Both in school and out, laborers and farmers are at hand to show how the task is done and to expatiate upon the significance of both the producer and the product in achieving the highest goal of the society – to 'serve the people' (17).

Of course mere knowledge of cultural "facts" is not evidence for community allegiance because facts are not meaningful in and of themselves. They do not function in isolation, though one can isolate them to examine or change their function. Facts can function equally well in community, competence, or individuating organizations of thought-action, and can be learned to the extent that they are organized for any of these purposes. This expectation is consistent with research on critical thinking in social studies. Studies which have compared different methods of teaching have concluded that facts are learned equally well whatever the method, while other outcomes vary more in relation to methods (85, 129).

In our earlier discussion of community, we pointed out that the whole system of controls in an educational environment is related to the community of teacher(s) and learners. Thus,

the learners' observance of general rules of conduct that allow, and indeed regulate, individuation might be thought of as a matter of community. This question is linked to research on the nature and extent of learner-learner cooperation, particularly "spontaneous" cooperation, behavior that is not directly induced or pressured by a teacher. A variety of classroom studies (3, 55, 80) illustrate the possibilities for this research. Spontaneous cooperation between learners tends to be associated with learner control. At the same time it seems to be associated with classroom meetings in which there is a high orientation of the teacher to the learners and the learners to one another. This would reflect positive interpersonal regard. It might also reflect a development of learner roles to more complex forms of community and individuation, as schematized in Figure 2.

Another approach to the general question of maintaining community obligations is suggested by the more "responsible" conduct observed during field trips (116) on the part of children from the same "activity" classrooms Jersild and his colleagues compared with control classrooms in the study referred to above.

Obviously a putatively "open" classroom can be rigid or disorderly by the standards of open educators themselves. What must be established is the relationship between what has actually happened in an educational environment, however it is labeled, and its observed outcomes (24). The studies mentioned so far include classroom observations, so they partly fulfill this requirement. The problem is, however, more difficult than it might appear. We need not only to establish changes over time, but also to sort out the effects of differently-structured settings *within* a given educational environment. An open classroom is likely to contain settings controlled by the teacher, settings controlled by the learners, and settings which are controlled, at least in some respects, by the teacher and learner jointly. This is just as true, though the proportions will differ, for an Engelmann-Becker classroom as for any other. To understand the effects of settings controlled in one way or another, we must cut across classrooms and projects to pull out all settings of a specified description. The techniques for this have not yet been fully developed, but the Follow Through research is making progress in this direction.

Specifically, Follow Through is attempting to assess the contributions of different classroom conditions to "cognitive" and "non-cognitive" achievement. The non-cognitive measures relate to locus of control, motivation, and self-esteem. Perceived locus of control is, of course, of particular relevance for the theory presented here. However, the measures developed so far for children, including the measures used in Follow Through, have low reliability and questionable validity as well. In addition, too few of the Follow Through studies have used the non-cognitive measures to permit a comparison of findings. The studies using the cognitive measures, on the other hand, do lend themselves to comparison. Mathematics and reading achievement relate to both community and competence: the former in so far as the tests measure the learning of the culturally fixed names and sequences of letters and numbers; and the latter to the extent that they measure verbal and numerical operations.

Cooley and Emrick (28) analyzed process observations and achievement test data from 42 kindergarten and 30 entering first grade classrooms. They employed a research model developed by Cooley and Lohnes to implement Carroll's (22) "model of school learning." A multiple regression analysis was performed with six variables: initial ability, opportunity (relative proportion of classroom activities directly related to criterion variables), motivation (the pupil's tendency to engage in learning activities when opportunity exists), structure and placement (the extent to which the curriculum is specified and the teacher's strategy involves differentiation and individualization of pupil instruction), instructional events (the relative incidence of teacher/pupil instructional interactions), and criterion ability. In the Cooley-Emrick study variation in classroom process explained approximately one-fourth of the variance in mean differences between classrooms in end-of-year reading and mathematics achievement.

Opportunity and motivation together constitute "time spent," the first of two key classes of process variables in the Carroll model. By themselves they do not specify whether the process is teacher controlled, learner controlled, or jointly controlled. They indicate only that the learner is engaged in criterion related activity. Structure, placement and instructional events constitute "instructional efficiency," the second key class of process variables. Consider more specifically how they operated in the Cooley and Emrick Analysis:

> **Structure and Placement** . . . In the available SRI (Stanford Research Institute) data, this variable is defined as the sum of observed occurrences of situations other than large-group instruction by the teacher; of teacher, aides, and volunteers working with individual children on academic subjects; of the relative use of academic materials, such as books, teaching materials, etc., for math, reading, and social studies; and of the relative occurrence of children working without adult assistance on academic tasks, e.g., workbooks (28, pp. 7-8).
>
> **Instructional Events** . . . This variable is defined as the observed incidence of pupil responses to teacher-presented issues (generally academic), the extent of teacher correct feedback and acknowledgment of these responses, and the general pattern and frequency of teacher acknowledgment of pupil task-related activity (28, p. 8).

Clearly some mix of teacher and learner control is involved in these situations. In fact, by our observations, the mix included one or another jointly controlled condition in the Follow Through programs of the University of Oregon and University of Kansas, the two that have produced the highest achievement gains. The Oregon children spent as much time working on individual academic assignments which they completed in a self-determined order as in small group recitations; the Kansas children spent most of their academic learning time in jointly paced individual assignments, during much of which time they worked with materials that provided single-answer feedback. Cooley and Emrick do not discuss the contributions of indi-

vidual process measures because the SRI measures available to them did not adequately operationalize the variables of the Cooley and Lohnes model. The original Carroll model attempted to translate all variables into time. For example, the efficiency of instructional settings was expressed by the relative times required for a given learning, other things being equal. Cooley's work suggests the feasibility, indeed, the necessity of interrelating time variables with control variables.

Stallings (109) has characterized the Follow Through programs scoring highest on the reading and mathematics tests as the "more structured" ones, but her operationalization of this statement also invites further examination in terms of control. In her separate analysis of the same 1971-72 data used by Cooley and Emrick, Stallings (108) identified six specific process variables which correlated most highly with achievement: frequency of mathematics and reading activities; feedback for specifically-defined child behavior; child responding with academic theme; child initiating interaction with adult; child instructing self; and, a variable that was less predictive in successive grades, praise for general behavior and achievement. Stallings' (109) analysis of the 1972-73 data identified similar variables which predicted achievement including small group instruction for first grade and large group instruction for third; frequency of stimulus-response-feedback interactions; self-instruction; and task persistence, or self-instruction over a few minutes or more, a variable particularly associated with the use of texts and workbooks.

In addition to her 1972-73 reading and mathematics findings, Stallings has reported that in 1972-73

> High scores on Raven's Coloured Progressive Matrices, a test of non-verbal perceptual problem-solving tend to be associated with the more flexible classroom where a wide variety of materials are used, many different activities occur, and children are allowed to select their own groups and seating part of the time (109, p. 11).

Cline (25) has found that the relative gains and losses in achievement between 1971-72 and 1972-73 in several of Follow Through's most contrasted reading and mathematics programs have changed significantly between kindergarten and first grade. He has further observed that this finding might be attributable to the increasingly complex-abstract nature of test items as the children progress to the next higher grade level. Pupils from the more learner-controlled programs gain, while pupils from the more teacher-controlled programs lose as a function of performance on these items.*

Commenting on an earlier review of early childhood education program evaluations, Stodolsky writes:

> I have noted that the operational definition of structured in most of the studies is teacher-directed. But I believe an appropriate way to think about this is to recognize that the structured programs are those which are most under control and therefore most homogeneous with respect to the behavior of the children. With this reinterpretation, the findings show that the more homogeneous programs are the most successful ones (111, p. 7).

*Personal communication with the author.

Taken in conjunction with Stodolsky's insistence that "outcome measures should be closely tailored to the curriculum under review" (111, p. 7), it may not be too drastic to translate her phrase "most under control" to mean "designed so as to distribute controls appropriate for the learning to be assessed" (our wording). This statement is consistent with Karlson and Stodolsky's (57) finding that the time children in a Montessori classroom spent with open, as opposed to single-answer feedback materials correlated with gains on test items that required problem *defining*.

A different study by Soar and Soar (106) utilized SRI cognitive achievement test data and the Soars' own observations in first grade Follow Through classrooms. The Soars performed separate factor analyses on the observation and the achievement data. They then examined the relationships between the resulting factors. Their findings stressed two observation data factors, "teacher directed activity vs. pupil directed activity" and "pupil initiation vs. drill," and one achievement data factor, "simple-concrete vs. complex-abstract" learning. The subtests loading most heavily at the simple-concrete pole of the achievement factor included knowledge of the alphabet and numerals; at the abstract-complex pole the subtests loading most heavily covered word meaning, copying, shape names, associate vocabulary, and sensory concept activation. When this factor was related to the two observation data factors, simple-concrete learning tended slightly to be associated positively with teacher-directed activity and with drill. Complex-abstract learning was associated slightly negatively with pupil-directed activity and pupil initiation, strongly negatively with teacher directed activity and drill, and *strongly positively with activity midway between the poles of both observations factors.*

Clearly the Soars' distinction between simple-concrete and complex-abstract learning is related to our continuum of knowledge as controlled by other, other and self jointly, and self alone. The names of the letters and numerals are controlled strictly by the collective other, and as such belong to the domain of community knowledge. The complex-abstract learnings are operational and pertain more to skills and concepts. However, systematization of concepts, skills, attitudes, and their application to problems, may entail more control by the self than standardized, group administered tests can recognize. This is reflected by the unanticipated questions or operations that are continually generated in a Piagetian structured task. Therefore, the learnings represented even by the "complex-abstract" items of the tests used in Follow Through probably do not adequately sample what we consider full-fledged, jointly self- and other-controlled competence.

The most valid evidence for the individuating effects of an educational environment or setting would be nothing less than a record of the individual learners' explorations, self expressions, creations, and problem findings. Many open classroom teachers do in fact maintain folders and notebooks that attempt to document these events. Carini (2) has been working on a phenomenological analysis of documents of this kind to trace the development of individual children in concrete as well as abstract directions, and the Plowden Committee (91) examined materials of this sort in assessing the effects of informal

practices in the British infant schools. Unfortunately a more formal analysis of such materials on a large scale is unmanageable with available techniques. Thus, like the most highly communal goals of education, the most individuating goals simply do not figure in the research and evaluation that policy makers regard most seriously. There are, however, near approaches to the problem that have proved feasible. In particular, studies of creative writing (39, 68) and of activities independently explored, initiated, and sustained by learners (55, 33) have indicated that greater learner control leads to increased individuation of the learners. Doerter's (31) study of the influence exerted by the painting styles of college art instructors on their students' work suggests a powerful approach to the assessment of individuation in a learning environment. Doerter found that student styles tended to resemble that of their instructor more at the conclusion of a semester than at the beginning. Clearly this pattern raises questions about the controls that were in effect. It also prompts curiosity about the development of students' styles over longer periods of time. Would individuation occur later through personal reconstructions of techniques learned during the course?

Our argument to this point has concentrated on reasons for expecting that a specific educational outcome is most likely to result from a setting that is controlled in ways congruent with the control of the outcome, or with the learners' expected orientation to control in the outcome. What are the likely consequences of incongruence between process and intended outcome? The obvious answer is that the intended outcome will not be achieved, but can we predict what outcomes will result instead?

Through close analysis of behavior stream observations of children in the Follow Through classrooms, the writer and his co-workers tested and confirmed a hypothesis that congruence among the controls of a setting (specifically among options, pacing, materials feedback, and learner-learner interaction) is associated with more on-task behavior than is incongruence of the setting controls (44). On-task behavior was defined structurally in relation to main goals the learners appeared to be directed toward, not moralistically in relation to what might be considered appropriate as an educational task. On-task behavior emerged as a consistent, immediately-observable indicator of learning in a variety of educational situations studied in research prior to our own (54); it has since been adopted by Bloom (15) as a variable of central importance for operationalizing Carroll's model of school learning and Bloom's (14) mastery learning. In addition, it is a crucial link between the two basic classes of events in Cooley (15) and Lohnes' formulation of the Carroll model, time spent on tasks related to the criteria sample and efficiency of the instructional environment. Going off task can be interpreted as reducing, by escaping, a discrepency or incongruence that is stronger than the learner will tolerate (cf. 53). A further possibility I advance, and it is yet undemonstrated, is that incongruence of control in the processes and the intended, or perceived, outcome of an educational setting will be associated with reduced on-task behavior. For example, on-task behavior is most likely to be associated with jointly controlled activity when it is directed toward the mastery of concepts and skills; on-task behavior would be less likely as jointly controlled conditions were directed toward community or individuating goals.

A second possibility is that the learner will attempt to change the conditions of a task in order to make them more compatible with the intended control of the outcome. For example, as suggested earlier, the student may try to obtain more control over a skill learning situation.

The third, and final, possibility is that the learner's perception of the intended outcome will change to accommodate the conditions of the task. For example, a skill may shift toward more embedded, less operational forms of thought-action when "rote" learning seems to be demanded in the situation.

All of these possibilities can be examined empirically. The control of teaching-learning processes and outcomes, as of setting processes and outcomes more generally, seems to warrant more detailed investigation.

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